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(54) PRODUCTION OF SOAP BARS

(71) We, COLGATE-PALMOLIVE COMPANY, a Corporation organised under the Laws of the State of Delaware, United States of America, of 300 Park Avenue, New York, New York 10022, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to the production of soap bars having indicia, such as letters, numbers, trade marks, designs or trade names.

The desirability of including indicia on or in soap bars has long been recognized and has been practiced for many years. Typically, the desired indicia are pressed or engraved into a face of the soap bar. The major drawbacks of such indicia are a lack of distinctiveness or contrast, and that the indicia do not extend very deeply into the bar and so disappear shortly after the soap has been put to use.

Although the desirability of inserting indicia into soap bars in such a way that they remain legible throughout the life of the bar has been recognized, numerous problems have been encountered in developing a commercially feasible method for acomplishing this objective. Attempts to insert indicia in the form of plastic water-soluble substances extending through the soap bar have resulted in illegible or indistinct lettering, surface roughness, separation of the indicia-forming material from the base soap material during use, and various other problems that have usually rendered the resulting product commercially worthless.

The present invention provides a method and apparatus for the production of soap bars having indicia that substantially maintain their integrity throughout the useful life of the bar and are free from serious surface roughness and cracks, the indicia extending between and being visible on opposed major faces of the bar. The invention also includes soap bars made by the method.

According to one aspect of the invention a method of producing extruded soap bars having indicia incorporated therein comprises: plodding a base soap material; mechanically working the plodded base soap material to increase its beta phase content; introducing into the mechanically worked base soap material, before the base soap material is extruded to form the soap bar, an indicia-forming soap material having substantially the same physical characteristics including beta phase content as the worked base soap material, in such locations that the indicia do not extend to the surface of an extruded log of the soap; extruding the base soap material containing the indicia-forming soap material to form the said log; transversely cutting segments from the extruded log and pressing the segments with a force directed parallel to the extrusion direction to form soap bars having the said indicia extending between and visible on opposed major faces of the soap bars.

According to another aspect of the invention, apparatus for producing soap bars having indicia visible only on opposed major faces of the bars comprises an extrusion die head for receiving a base soap mass and having an outlet nozzle for discharging the base soap mass as a log having the desired cross-section of the soap bars; a first plodded for forcing the base soap mass into the die head and out through the outlet nozzle; a tubular conduit within the die head having a terminal cross-section corresponding to the indicia and terminating adjacent the entry to the outlet nozzle in such a position that soap emerging from the tubular conduit will not contact the walls

of the outlet nozzle; a second plodder for supplying a secondary soap mass to the tubular conduit; the first and second plodders being such as to apply to the base soap mass and to the secondary soap mass, respectively, mechanical working such as to give each soap mass substantially the same beta phase content; a chamber interposed between the first plodder and the die head through which passes a plurality of tubular passageways communicating with the first plodder and with the die head downstream of the chamber, and the chamber around the tubular passageways communicating with the second plodder and with the tubular conduit; cutting means disposed on the downstream side of the outlet nozzle to cut the extruded log of soap transversely of the direction of extrusion into segments at intervals equal to the desired thickness dimension of the soap bars; and pressing means for applying force directed parallel to the thickness dimension for shaping the soap bars into predetermined shape with the said major faces transverse to the direction of the pressing force.

According to a further aspect of the invention a soap bar made by the said method comprises a piece of base soap material having a pair of opposed major faces and indicia of an insert soap material extending through the bar between and visible on the major faces, the insert soap material having physical properties, including beta phase content, substantially the same as the base soap material and a colour contrasting with the base soap material.

Except for being visually distinguishable from the base soap material e.g. having a different colour, the insert soap material is required to have physical characteristics, including water-solubility, softness, moisture content and crystalline structure, particularly beta phase content, substantially the same as those of the base soap material.

Generally, soap materials, even though having substantially the same chemical composition, do not necessarily have the same physical characteristics if they contain substantially different amounts of beta phase. Striped, variegated, or indicia-containing soap bars made from two or more soaps having substantially the same chemical composition but significantly different beta phase contents are likely to form ridges and surface cracks during manufacture and/or use due to dissimilar physical properties resulting from the differing beta phase contents.

Most commercial toilet soap contain a mixture of crystals in both the omega and beta phases. The relative amount of each phase is determined from the X-ray pattern of the soap using the short angle scatter method and X-ray crystallography techniques well known in the art.

The beta phase content of a plodded soap material depends primarily on its initial composition and the amount of mechanical working it is subjected to during processing. To obtain a high beta phase content in the soap materials preferably utilized in performing the invention, generally above 50% by weight, preferably between 60 and 100%, the initial soap should have a moisture content of at least 13.5% by weight and comprise primarily the salts of saturated long straight chain fatty acids, preferably those having a C_{16} and C_{18} carbon chain. Suitable soap materials are then mechanically worked to a sufficient degree to result in the maximum amount of beta phase obtainable with the specific soap composition used, which is generally greater than 50% by weight.

The primary means for mechanically working the soap materials are the plodder screws or worms and the plodder pressure plates which have a plurality of small diameter orifices through which the soap is forced. Also, in the apparatus of the invention, the soap materials are forced through additional tubular passageways in a manner to be more particularly described hereinafter. These provide a significant additional amount of mechanical working to both the indicia-forming and base soaps to maximize the beta phase content of each.

The indicia-forming material soap is joined with the base soap material adjacent the entry to the extrusion nozzle through which the soap materials are extruded to form the continuous log of soap from which the individual soap bars are cut. The indicia-forming soap material is delivered adjacent the entry to the extrusion nozzle through a conduit or a number of conduits terminating at outlets shaped to the desired form of the indicia. The (or each) conduit communicates with the worm of a secondary soap plodder that supplies the force necessary to convey the indicia-forming soap material from its source to its point of insertion into the base soap material.

The terminal outlet of the (or each) conduit is disposed adjacent the entry to the extrusion nozzle because if that terminal outlet were located a significant distance upstream of the nozzle it would tend to produce indicia that are less distinct.

Conventionally, soap is formed into bars by discharging the plastic soap mass through an extrusion nozzle having a cross-section corresponding to the thickness and width of the final bar. The extruded, continuous log is then cut into segments equal to the desired bar length. Conventional soap bars of this type have an extrusion grain running parallel to their longitudinal axis and major faces. Such soap bars are subsequently

pressed to final shape by forces directed transverse to the major faces and extrusion grain of the bar.

The extrusion nozzle of the apparatus of the invention has a cross-section corresponding to the major faces of the final bar, so that the inserted indicia extend between the major faces. Contrary to the aforementioned conventional procedure of forming soap bars, the indicia-containing log of soap material is discharged from the extrusion nozzle and cut into sections at intervals equal to the desired thickness of the individual soap bars. Consequently, the extrusion grain imparted to the bars during their discharge from the plodder nozzle runs transverse, rather than parallel, to the major faces of the soap bar. These bars must therefore be pressed to their final shape by forces directed parallel rather than transverse to the direction of extrusion and the grain of the bar.

The indicia-containing soap bars may be pressed and shaped to a desired predetermined configuration without seriously roughening or cracking the major faces, by maximizing the beta phase content of both soaps. Beta phase soap is characteristically more plastic and mouldable than omega phase soap and less subject to roughening and cracking when pressed by forces directed parallel to the extrusion grain. To maximize the beta phase content of the soaps they are advantageously plodded through what is known in the industry as a Mazzoni plodder, in series with the additional tubular and passageways to be more specifically described hereinafter. The Mazzoni plodder has a high pressure extrusion screw and, typically, two or three pressure plates which have a plurality of small orifices, through which the soap is forced. The combination of a high pressure extrusion screw and small orificed pressure plates subjects the soap material to a high degree of mechanical working.

Additionally, the apparatus of the invention may include an auxiliary shell and tube assembly disposed between the main plodder worm and the extrusion nozzle. This assembly comprises a generally cylindrical shell defining a chamber through which extend a plurality of parallel tubes defining tubular passageways. These passageways are supplied with base soap material by the worm of the primary plodder while the part of the chamber surrounding the tubes (herein termed the shell side of the assembly) receives indicia-forming soap material from a secondary plodder. The shell and tube assembly keeps the base soap material and indicia-forming soap material separate but in heat-exchange relationship until the indicia-forming soap material is discharged through the indicia-forming conduit or conduits into the base soap material in the immediate vicinity of the entry to the extrusion nozzle. The shell and tube assembly and the indicia-forming conduits provide a substantial amount of additional mechanical working and beta phase conversion to both soaps.

Embodiments of the apparatus, method, and soap bars of the invention will now be described by way of example with reference to the accompanying drawings, in which:—

Figure 1 is a schematic partial view of a production line for producing indicia-containing soap bars;

Figure 2 is a section elevation of part of the apparatus of the invention;

Figure 3 is a cross-section taken along the line 3-3 of Figure 2, showing the discharge pressure plate of the shell and tube assembly;

Figure 4 is a partial front perspective view of the plodder nozzle and the outlet ends of the indicia-forming soap conduits;

Figure 5 is a schematic cross-sectional view of soap pressing dies before shaping the soap bars; and

Figure 6 is a perspective view of a soap bar.

Referring to Figure 1, the terminal portion of a soap production line, including the apparatus of the invention generally indicated by the numeral 10, is shown. The production line of Figure 1 includes a primary plodder 11, a secondary plodder 12, a knife 13 for cutting the continuous extrudate or log into segments equal to the desired thickness of the final soap bar, and a conveyor 14 for conveying the rough cut bars 15 to a soap pressing station 16 wherein the bars are shaped to the desired final configuration. Either one or both of plodders 11, 12 can be and preferably are of the Mazzoni type with high pressure extrusion screws or worms.

As shown in Figure 2, the indicia-forming soap material is plodded by the secondary plodder 12; forced through a screen 17 and a pressure plate 18 into a jacketed connecting elbow 19 which is joined to a jacket cylinder 20 and a shell 21 of a shell and tube assembly 23. The screen 17 has many uniform size openings of about 0.5 mm to about 2 mm in diameter. The pressure plate 18 functions primarily as a support for the screen 17 and has orifices 22 corresponding to the openings in the screen 17. The combination of the screen 17 and the pressure plate 18 provides mechanical working to the indicia-forming soap as it flows from the plodder worm 41 into the connecting elbows 19. The elbow 19 is held by bolted flanges or other suitable means to the secondary plodder 12. The indicia-forming soap material is supplied to the shell

side of the shell and tube assembly 23, from which it is fed through conduits 24, 25 to a point immediately before or at the plodder nozzle 26 where it is discharged through indicia-forming outlets 27, 28 (see Figure 4).

The base soap material is plodded through the primary plodder 11 and is forced through a screen 29 supported by a pressure plate 30 into a plodder cone section 31, and into the tubes of the shell and tube assembly 23. The screen 29 and the pressure plate 30 are similar to the corresponding elements 17 and 18 in the secondary plodder 12 and function to work the base soap material mechanically as it passes from the plodder worm 39′ into the cone section 31.

The base soap material is fed from the plodder cone 31 through the tubes 32 of the assembly 23, into a chamber 33 and through the plodder nozzle 26. The chamber 33 is joined to the shell and tube assembly 23 by means of bolted flanges 34, 35 or other suitable means, and is jacketed by a cylinder 36 which forms a space for the circulation of a heating or cooling medium around the barrel 33. The heating or cooling medium can be supplied and removed from the cylinder by suitable means such as couplings 37. The shell 21 is similarly jacketed by the cylinder 20 which forms means for circulating a heating or cooling medium. Suitable inlet and outlet means (not shown) are provided to supply and remove the heating or cooling medium from the cylinder 20.

The plodder nozzle 26 receives the soap mass, including extruded indicia deposited by the outlets 27, 28, from the barrel 33, and forms it into a continuous log having a cross-section corresponding to the major face dimensions of the soap bar. Accordingly, the plodder nozzle 26 has interior dimensions substantially equal to the desired length and width of the final bar. The continuous log leaving the plodder nozzle 26 is cut into segments corresponding to the desired thickness of the final bar by the cut off knife 13. The rough cut bars 15 are thereafter conveyed by the conveyor 14 to the soap pressing station 16. The rough cut bars leaving the cut off knife 13 have an extrusion grain running transverse to the major faces of the bar.

The conduits 24, 25 communicate with the shell side of the shell and tube assembly 23 and terminate in the indicia-forming outlets 27, 28 (see Figure 4). When forming letters such as O for insertion into the base soap mass it is necessary to provide a passageway 38 within the conduit 25 and the die 28 in order to supply a cylinder of base soap material to the centre of the letter. As shown in Figure 2, the passageway 38 communicates with the conical section 31 of the primary plodder 11. Base soap material is forced, by operation of the main plodder worm 39′, through the passageway 38 (as well as through the tubes 32), and into the centre of the tubular stream of indicia-forming soap discharged through the outlet 28.

The conduits 24, 25 terminate adjacent the entry to the plodder nozzle 26 in order to minimize distortion of the indicia-forming soap material after it is introduced in the form of indicia into the base soap material. It has been found that best results, i.e. the most distinct indicia, are obtained when the indicia-forming soap material is discharged into the base soap material as the base soap material is entering the plodder nozzle.

The shell and tube assembly 23 comprises a plurality of tubes 32, which are of internal diameters in the range of from 0.4 to 2 centimeters and will usually be from 10 to 50 centimetres long. These tubes form a number of parallel passageways, generally from 3 to 100, preferably from 5 to 50. The tubes 32 may communicate with orifices 39 in the flange 34 that are substantially smaller in diameter than the tubes 32. The orifices 39 are usually in the range of from 0.5 to 10 millimetres in diameter. The orifices 39 are preferably about one tenth of the diameter of the tubes 32. Thus, if the tubes 32 have an inside diameter of 1 cm, the orifices 39 are preferably 1 mm in diameter. The transition of the base soap material from the tubes 32 to the orifices 39 provides a substantial amount of mechanical working to the base soap material prior to the plodder nozzle and substantially contributes to the maximum conversion of the base soap to beta phase.

The indicia-forming soap conduits 24, 25 and their outlets 27, 28, are dimensioned to produce indicia of the desired size and configuration. Preferably the combined cross-sectional area of the conduits 24, 25 is substantially less than the free cross-sectional area of the shell side of the shell and tube assembly 23. The mechanical working of the indicia-forming soap material resulting from the passage from the shell side of the shell and tube assembly 23 to the conduits 24, 25 substantially contributes to the conversion of this soap material to beta phase.

In contrast with the typical method of producing soap bars, wherein the bars are extruded in a direction parallel to the major faces of the bar and the extrusion grain is consequently parallel to the major faces of the bar, the indicia-containing soap bars 15 are extruded in a direction transverse to their major faces and consequently have an extrusion grain 40 running transverse to the major faces (see Figure 6).

The individual rough bars 15 are subjected to pressing forces, indicated by arrows in Figure 5, parallel to their extrusion grain. These pressing forces are applied by pressing dies 42 at the soap pressing station 16. At the pressing station 16 the major faces of the bar are engaged by the pressing dies 42 which shape the bar to the desired configuration and smooth the surfaces. Since the extrusion grain 40 of the bar is transverse to its major faces, the forces applied by the pressing dies are parallel to the extrusion grain of the bar.

By providing the base soap material and indicia-forming soap material with a high content of beta phase, the bars can be pressed in the foregoing manner without cracking or imparting thereto a rough texture such as is characteristic of prior art bars pressed in this manner.

The beta phase content of the soaps is maximized by providing the tubes 32, the reduced diameter orifices 39, the conduits 24, 25 and the extrusion dies 27, 28 for mechanically working the soap materials, in addition to the screens 17, 29, the pressure plates 18, 30 and the plodder worms 39′, 41. Preferably, both or either of plodders 11, 12 are Mazzoni plodders which are well known in the art and provide the soap with a substantial degree of mechanical working.

Preferably the base soap material is a white or a light coloured soap and the indicia-forming soap material has a colour that contrasts with that of the base soap material. Additionally, the indicia-forming soap material should possess physical characteristics such as plasticity, water-solubility, softness, moisture content and beta phase content substantially the same as the base soap material and be sufficiently compatible with the base soap material so as not to result in degradation of either portion of the final bar due to objectionable oxidation or other reactions. They will then hold together tightly and not preferentially dissolve in use, leaving ridges and inequalities in the product. Accordingly, it will be usual for most of the base and indicia-forming soap materials to be the same, with only slight differences therein due to colouring materials, and possibly perfumes, plasticizers, or minor proportions of adjuvants. Generally, the compositions of the base and indicia-forming soaps will be from 90 to 95% the same. Of course, in addition to colour contrasts, there may be other distinctively different adjuvant properties given to the base and insert portions. For example, different perfumes may be employed, one to complement the other, and different minor adjuvants may be present. The soaps employed can be those which are standard in commercial production today, e.g. blends of alkali metal soaps, preferably sodium soaps, of tallow and coconut oil fatty acids, or equivalent materials. Normally, these will comprise from 50 to 90% of tallow and from 10 to 50% of coconut oil fatty acid soaps. Preferred are those of 10 to 40% coconut oil soap and 60 to 90% tallow soap.

Sodium soaps of higher fatty acids are preferred; these are suitably plastic and convertible to high beta phase content when they contain from at least 13.5% to about 25% moisture, on a total basis, although higher moisture content soap can be used, e.g. up to 40%. The soaps will usually be from 80 to 90% of sodium soaps of higher fatty acids, most preferably having C_{16}-C_{18} straight carbon chains. To make such materials suitably plastic, the temperatures of the jackets around the plodders, the plodder barrel and the shell and tube assembly will usually be in the range of from 30 to 60°C. Generally, it will be desirable to utilize water jackets over plodder parts and for the shell and tube assembly, and an oil jacket around the plodder barrel. In either case, the temperature of the soap, for best plodding and fusion, will be from 35°C to 55°C, most preferably from 38°C to 45°C.

At the above conditions, with the described apparatus, it will usually be a simple matter to produce a final soap bar of desired appearance and durability. However, in some cases, up to 10%, usually about 1%, of a plasticizer, such as glycerol, polyoxyethylene glycol, sorbitol, other di- or polyhydric alcohols of 2 to 10 carbon atoms and 2 to 6 hydroxyls, petrolatum, paraffin, stearic acid, other higher fatty acid of 10 to 18 carbon atoms, or a hydrotropic compound such as sodium xylene sulphonate, potassium cumene sulphonate, sodium benzene sulphonate or other lower alkyl-substituted benzene sulphonate may be added to the soap compositions to improve the bonding strength thereof. In some preferred formulate, glycerine, potassium soap and sodium toluene sulphonate, will be used together or in various subcombinations.

If desired, either one or both of the plodders can be operated under subatmospheric pressure. Any subatmospheric pressure may be used but will preferably be from 1 mm to 300 mm of Hg absolute, the lower portions of this range being preferred to dearate the soaps. Such vacuum will be employed, preferably, in all of the plodders being used. Motor speeds, worm pitches, diameters and root diameters may vary but usually will not depart from those which are conventional in the usual soap making operations. Thus, worm speeds of 2 to 50 r.p.m., preferably 5 to 25 r.p.m., are generally employed. The worm may be of a

diameter from 2 inches to 16 inches or even more in some cases, but preferably will be between 4 and 10 inches in diameter. The length of the worm and the barrel will usually be from 3 feet to 10 feet. Throughputs of soap may be from as little as 1 pound per minute to 100 pounds per minute, depending on equipment sizes.

Materials of construction of the apparatus may be varied, depending on the composition of the soap being processed. In most cases, stainless steel, polytetrafluoroethylene, nylon or other materials will be preferred for parts in contact with the soap, although often a good grade of steel may be employed, providing that the equipment is kept well cleansed and free from rust.

In addition to the plodders employed, other conventional soap line equipment (not shown) will be used. This equipment includes amalgamators, mills, elevators, other feeding devices and various measuring devices and automatic controls to help coordinate and synchronize the operations of the different machines. Such apparatuses, although important for the obtaining of the desired chip, ribbon, rod, powder or other material to feed to the plodders, are well known and do not relate closely to the present invention.

The following Example illustrates the invention. In the Example and elsewhere in the specification all parts and percentages are by weight.

EXAMPLE

An indicia-containing soap bar of the type illustrated in Figure 6 is made by utilizing the equipment of Figures 1-5. The soap base comprises 95.7% sodium soap of a fat charge of 62% beef tallow and 38% coconut oil; 4% distilled palm oil fatty acids; and 0.3% of antioxidants, sequestrants (EDTA) and stabilizers. The soap, initially of a moisture content of about 33% (kettle soap) is dried to a moisture content of about 15%. It is then ready to be used as a base for the indicia-containing soap bars. 95.8 parts of the foregoing soap base, 0.2 parts titanium dioxide, 1 part perfume, 2 parts water and 1 part glycerine are mixed together to produce a chip which, after moisture loss, has about 15% moisture content. Another soap, this one of a dark green colour, is made by milling 94.3 parts of the base chips, 0.3 parts titanium dioxide, 1 part perfume, 1 part water and 1 part glycerine. To this milled soap there is added an aqueous dispersion of 0.03 part of a water-dispersible green pigment in 1 part water and 0.5 part glycerol. The coloured soap so produced is fed into the shell side of the shell and tube assembly 23 by the secondary plodder 12 while the base soap is fed through the tube side by the main plodder 11. The production rate employed, while it may be varied, is about 30 lbs./min. and the feed rates are adjusted accordingly.

The various pieces of equipment are jacketed, the worms of the plodders being water-jacketed with the water therein being held at a temperature of 25-35°C. The jacket 36 on the barrel 33 is filled with circulating oil at 45-60°C.

The main plodder worm 39' revolves at about 10 r.p.m. The openings in the pressure plate 30 through which the base soap passes into the plodder cone section 31 are in the range of 2 to 5 mm. During the plodding operations the soap temperate is maintained at about 40°C, and in the shell and tube assembly this is raised to about 45°C. The base and indicia-forming soap materials, although not in physical contact in the shell and tube assembly, are in thermal communication and approximately the same temperatures.

As illustrated in the drawing, the base soap passes through the tubes 32 which number approximately 50, each of which is of a diameter of about 1 cm, and into the barrel 33 after being forced through the orifices 39 in the plate 34 which have a diameter of about 1 mm. The insert soap material is supplied to the shell side of the shell and tube assembly 23 through the pressure plate 18 wherein it surrounds the tubes 32. From the shell and tube assembly, the indicia-forming soap material is forced into the conduits 24, 25 from which it is discharged through the extrusion dies 27, 28 into the base soap mass immediately prior to the plodder nozzle 26. For uniformity in the product, the indicia-forming soap material is extruded into the base soap material at substantially the same rate as the base soap material is extruded through the plodder nozzle.

The product of the foregoing process and apparatus is shown in Figure 6. The rough bar 15 is shown prior to the final pressing step and immediately after being cut from the continuous log extruded through the plodder nozzle 26. The bar 15 has predetermined length (l), width (w) and thickness (t) dimensions; it comprises a body portion formed by the base soap material 43 and indicia soap material 44. The indicia soap material 34 extends between and is visible on both of the opposing major faces which are defined by the l and w dimensions of the soap bar. The soap bar is extruded to its length (l) and width (w) dimensions and is cut into segments equal to the desired thickness (t). Accordingly, the extrusion grain 40 of the soap bar runs between the major faces and is transverse to them. Consequently, when the rough bar of Figure 6 is pressed to its final shape in the soap press between the dies 42, the shaping

forces are applied parallel to the extrusion grain. Ordinarily, the application of shaping forces parallel to the extrusion grain of a soap bar results in surface cracking and roughness, both of which, of course, are highly undesirable in a commercial product. However, it has been found that the soap bars, probably because of their soft characteristics due to the high beta phase content impart by the mechanical working in the apparatus employed, can be pressed to shape without significant adverse consequences.

WHAT WE CLAIM IS:—

1. A method of producing extruded soap bars having indicia incorporated therein comprising: plodding a base soap material; mechanically working the plodded base soap material to increase its beta phase content; introducing into the mechanically worked base soap material, before the base soap material is extruded to form the soap bar, an indicia-forming soap material having substantially the same physical characteristics including beta phase content as the worked base soap material, in such locations that the indicia do not extend to the surface of an extruded log of the soap; extruding the base soap material containing the indicia-forming soap material to form the said log; transversely cutting segments from the extruded log, and pressing the segments with a force directed parallel to the extrusion direction to form soap bars having the said indicia extending between and visible on opposed major surfaces of the soap bars.

2. A method as claimed in Claim 1 wherein both the base soap and the indicia-forming materials have a beta phase content above 50% by weight.

3. A method as claimed in Claim 1 or Claim 2 wherein the mechanical working includes forcing the base soap material in a plurality of parallel streams each through a tubular member and then through an orifice having a diameter substantially smaller than the diameter of the tubular member.

4. A method as claimed in any of the preceding claims which comprises; supplying a first flow of the base soap material through the die head of a plodder and towards an extrusion outlet nozzle of the die head; and discharging a second flow of the indicia-forming soap material through an indicia-forming outlet within the die head into the body of the base soap material as the base soap material enters the extrusion outlet nozzle, in the same direction and at substantially the same linear rate as the first flow.

5. A method of producing soap bars having indicia incorporated therein, substantially as described with reference to the accompanying drawings.

6. Apparatus for producing soap bars having indicia visible only on opposed major faces of the bars; the apparatus comprising an extrusion die head for receiving a base soap mass and having an outlet nozzle for discharging the base soap mass as a log having the desired cross-section of the soap bars; a first plodder for forcing the base soap into the die head and out through the outlet nozzle; a tubular conduit within the die head having a terminal cross-section corresponding to the indicia and terminating adjacent the entry to the outlet nozzle; in such a position that soap emerging from the tubular conduit will not contact the walls of the outlet nozzle; a second plodder for supplying a secondary soap mass to the tubular conduit; the first and second plodders being such as to apply to the base soap mass and to the secondary soap mass, respectively, mechanical working such as to give each soap mass substantially the same beta phase content; a chamber interposed between the first plodder and the die head through which passes a plurality of tubular passageways communicating with the first plodder and with the die head downstream of the chamber, and the chamber around the tubular passageways communicating with the second plodder and with the tubular conduit; cutting means disposed on the downstream side of the outlet nozzle to cut the extruded log of soap transversely of the direction of extrusion into segments at intervals equal to the desired thickness dimension of the soap bars; and pressing means for applying force directed parallel to the thickness dimension for shaping the soap bars into predetermined shape with the said major faces transverse to the direction of the pressing force.

7. Apparatus as claimed in Claim 6 wherein the cross-sectional area of the die head downstream of the chamber is substantially greater than the total of the cross-sectional areas of the tubular passageways.

8. Apparatus as claimed in Claim 6 or Claim 7 wherein the tubular passageways communicate with the die head downstream of the chamber through a plurality of orifices, these orifices having a diameter substantially less than the diameter of the tubular passageways.

9. Apparatus as claimed in Claim 8 wherein the tubular passageways have a diameter in the range from 0.4 to 2 centimetres and the orifices have a diameter in the range from 0.5 to 10 millimetres.

10. A soap bar made by a method as claimed in any of Claims 1 to 5 comprising a piece of base soap material having a pair of opposed major faces and indicia of an insert soap material extending through the bar between and visible on the opposed

major faces, the insert soap material having physical properties, including beta phase content, substantially the same as the base soap material and a colour contrasting with the base soap material.

11. A soap bar as claimed in Claim 10 wherein both the base and insert soap materials comprise at least 50% by weight of beta phase soap.

12. A soap bar as claimed in Claim 11 wherein both the base and insert soap materials comprise from 60 to 100% by weight beta phase soap.

13. A soap bar as claimed in any of Claims 10 to 12 wherein both the base and insert soap materials have a moisture content of at least 13.5% by weight.

14. A soap bar as claimed in any of Claims 10 to 13 wherein both the base and insert soap materials comprise soaps of C_{16} to C_{22} straight chain fatty acids.

15. Apparatus for producing soap bars having indicia incorporated therein substantially as described with reference to the accompanying drawings.

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Agents for the Applicants.

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1387601 COMPLETE SPECIFICATION

2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

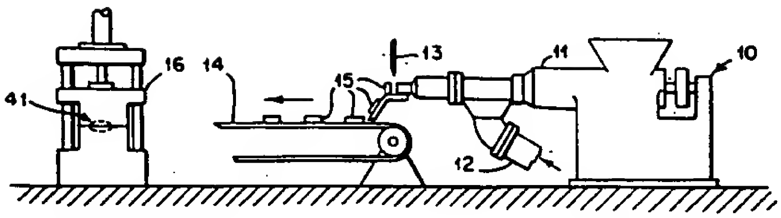

Fig.1

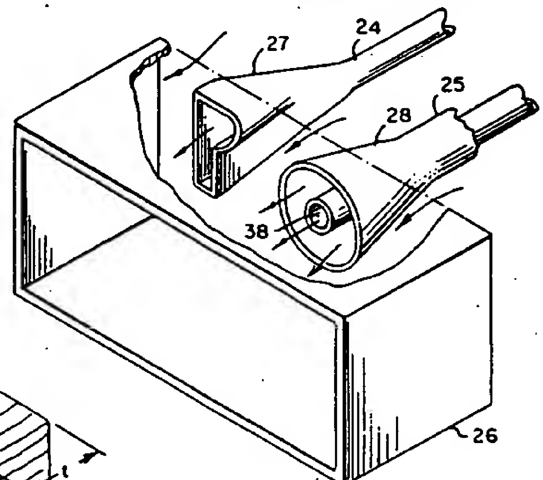

Fig.4

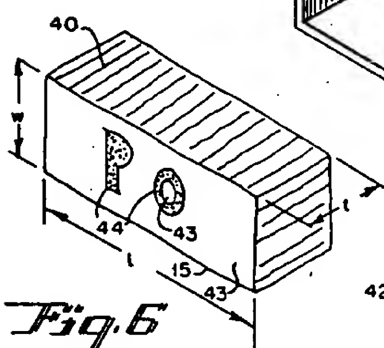

Fig.6

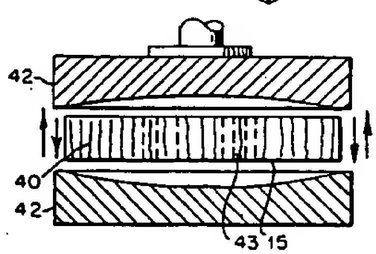

Fig.5

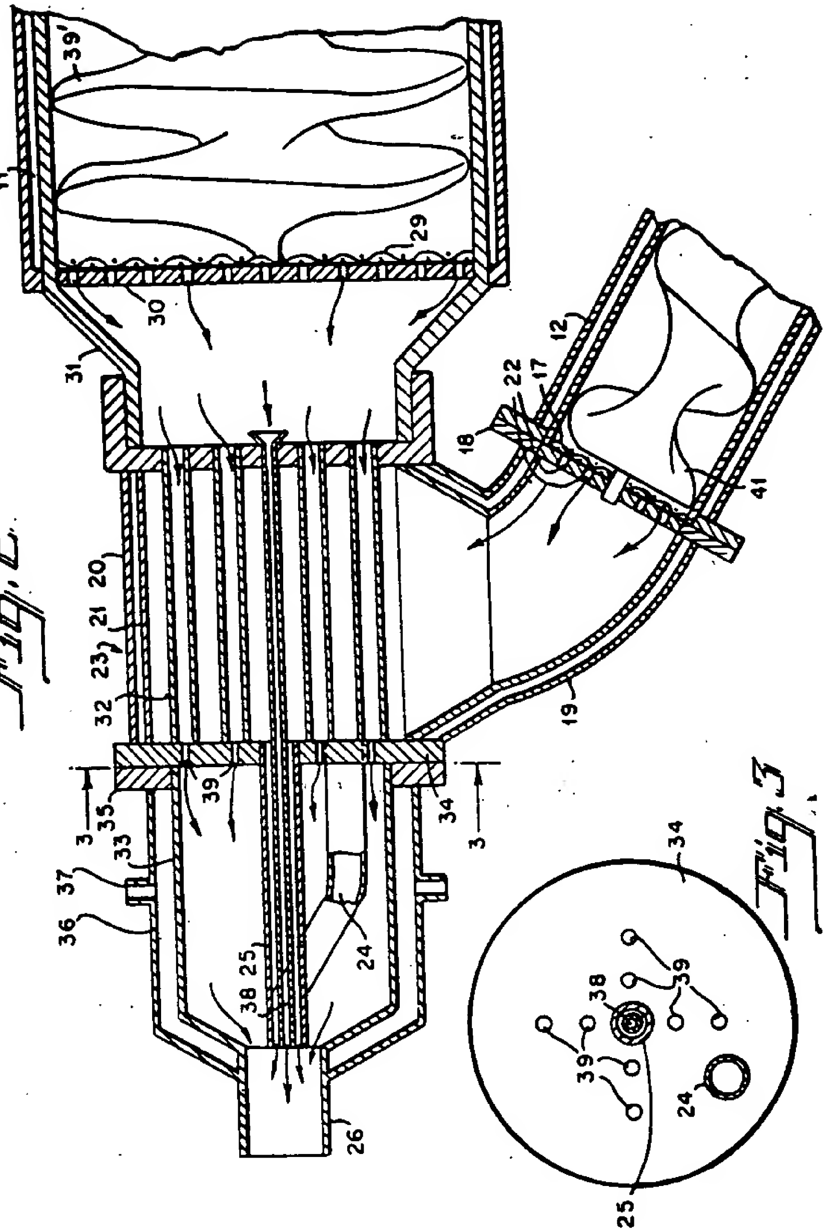
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Fig. 2

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Fig. 3